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a single line, especially with numerous stations. When a great velocity is obtained, the tractive force of the locomotive is much reduced, and therefore a much greater velocity can be attained on an atmospheric railway.

The inquiries of the author into the amount of resistance exerted by the air on railway trains lead him to the conclusion that in the atmospheric railway the loss of tractive power of the piston from friction, &c. is very inconsiderable; and that the resistance of the air is less than had been hitherto estimated, not exceeding, on an average, ten pounds per ton on the average weight of trains.

A tabular statement is then given of the results of the experiments made by the British Association, for the purpose of comparing them with those obtained by the author from his own observations, and more particularly from his experiments on the Croydon Atmospheric Railway. The general conclusion which he draws from this investigation is that the resistance of the air in a quiescent state is less than had been previously estimated, and that the ordinary atmospheric resistance in railway progression arises from the air being generally itself in motion, and as the direction of the current is almost always oblique, from its producing increased friction in the carriages themselves. This kind of resistance will not increase as the square of the velocity; and as it is the principal one, it follows that the resistance to railway trains increases in a ratio not much higher than the velocity, and that the practical limit to the speed of railway travelling is a question, not of force, but of safety.

March 26, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

George Newport, Esq. was elected a Fellow of the Society.

“On the Muscularity of the Iris.” By Professor Maunoir, of Geneva. Communicated by P. M. Roget, M.D., Sec. R.S.

The author has satisfied himself, from the result of his own dissections, as well as from the concurrent testimony of a great number of anatomists, that the iris is provided with two sets of muscular fibres, the one orbicular, immediately surrounding the pupillary margin and acting as a sphincter; the other, extending in a radiated direction from the exterior circumference of the former to their insertions into the ciliary ligament, their action being to enlarge the pupil. One-fourth of the disc of the iris is occupied by the orbicular, and the remaining three-fourths by the radiated muscle. The author has examined the structure of the iris in a great number of animals, and states the results obtained by M. Lebert, whom he applied to on this occasion, from numerous dissections of the eyes of animals belonging to each class of vertebrata. He also refers to a work which he published in the year 1812, entitled “*Mémoire sur*

l'Organisation de l'Iris," for evidence of the muscularity of the iris which he obtained by applying galvanism to the human eye immediately after decapitation ; and he concludes with the narrative of the case of a woman in whose iris there had been formed, by an accidental wound with the point of a knife, a triangular aperture below the pupil. This aperture became dilated when the pupil was contracted, and *vice versâ* ; thus furnishing a proof that its movements were effected by muscular action.

April 2, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

Major Cautley was elected a Fellow of the Society.

Contributions to the Chemistry of the Urine. Part II. "On the Variations in the Alkaline and Earthy Phosphates in Disease." By Henry Bence Jones, M.D., Fellow of the Royal College of Physicians. Communicated by Thomas Graham, Esq., F.R.S., &c.

The analyses, of which the results are given in a series of tables, were made by the author, chiefly from the urine of patients labouring under different diseases in St. George's Hospital, and therefore nearly under the same circumstances as far as exercise was concerned. He found that the variations in the earthy phosphates were in general independent of the nature of the disease. In fractures of the spine and paraplegia, however, the total amount of these salts was slightly above the healthy standard during the early period, and when inflammatory action might be considered as prevailing ; but when this action had subsided, and the affection had become chronic, the total quantity of phosphatic salts was less than natural. In chronic diseases of the brain, and in chronic and even in acute diseases of the membranes, no increase of these salts was observed. In fractures of the bones of the skull, when inflammation of the brain supervened, there was a slight increase of the total amount of phosphates ; but no such increase occurred when the head was not affected, even although acute inflammation of other organs existed. In acute inflammation of the brain there was an excessive secretion of phosphates, which returned to the natural quantity as soon as the inflammation passed into the chronic state. In some functional diseases of the brain, attended with delirium, the secretion of the salts was excessive ; but the excess ceased with the disappearance of that symptom. In other functional diseases, as in fevers, no excess was observable. In delirium tremens, when food could be taken, there was neither excess nor deficiency ; but in the most violent cases, where no food could be taken, the quantity of the phosphates was diminished in a most remarkable degree. In the general paralysis of the insane, no increase of phosphates was observed. One case of acute paroxysm of mania showed a small in-